

**THE ARB BORD OF HEALTH SPECIALIZATIONS
SCIENTIFIC COUNCIL OF ANAETHESIA**

**FIRST EXAM – PAPER ONE
16 SEPTEMBER 2014
9 – 11 A.M**

NAME:

NUMBER:

CENTER:

1. All of the following factors decrease gastric emptying, **EXCEPT**:

- A. Acidity in the duodenum
- B. High-protein meal
- C. Alcohol ingestion
- D. Vagal stimulation
- E. Opioids

UK / 2. Regarding ingested lipids, all the followings are true, **EXCEPT**:

- A. Is important in prostaglandin synthesis
- B. Increases in the faeces with a decrease in bile secretion
- C. Is absorbed via the intestinal blood capillaries
- D. Is mainly in the form of triglycerides
- E. Can be used as a source of ATP production

UK / 3. Carbonic anhydrase is found at high concentration in all of the following, **EXCEPT**:

- A. Cardiac muscle cells
- B. Red blood cells
- C. Renal tubular cells
- D. Gastric parietal cells
- E. All mentioned above

/ 4. Regarding buffering system in acid-base balance, all the following are true **EXCEPT** :

- A. 75% of buffering occurs intracellularly by protein
- B. Phosphate buffering is important in plasma
- C. Bicarbonate buffering occurs mostly in the plasma
- D. Ammonia is a buffer in the renal tubule
- E. Reduced haemoglobin combines with hydrogen ions

/ 5. Regarding basal metabolic rate, all the following are true **EXCEPT**:

- A. Men and women have equal basal metabolic rates .
- B. May be measured using spirometry .
- C. Is higher in children than in adults
- D. Is subject to diurnal variation
- E. Is related to body surface area

6. Concerning juxtaglomerular apparatus, ONE is TRUE:

- A. Regulates the volume of urine produced
- B. Regulates sodium reabsorption
- C. Secretes aldosterone
- D. Secretes rennin
- E. Maintains acid-base balance

7. A decrease in cortisol secretion would lead to ONE of the following :

- ✓ A. Increased storage of glycogen in the liver
- B. Decreased ACTH secretion
- C. Decreased adrenomedullary synthesis of adrenaline
- D. Increased plasma glucose content
- E. Increased hepatic protein synthesis

8. An increase in plasma parathyroid hormone (PTH) level would lead to an increase in ONE of the following :

- A. The number of active osteoblasts
- B. Plasma inorganic phosphate concentration
- ? ✓ C. Renal synthesis of calcitriol
- D. Collagen synthesis
- E. Renal proximal tubular reabsorption of Ca^{2+}

9. Prolonged respiratory alkalosis, can be associated with all of the following , **EXCEPT**:

- ✓ A. Increased ionised calcium in the blood
- B. Increased bicarbonate concentration in the urine
- C. Decreases pH inside the red blood cells
- D. Shifts the oxygen dissociation curve to the left
- E. Hypokalaemia

10. Regarding the blood-brain barrier, which one is false:

- A. Results in certain molecules in the blood taking longer to equilibrate with tissue fluid in the brain than with tissue fluid elsewhere
- B. Permits CO_2 to pass freely
- C. Is more permeable to fat-soluble than water-soluble substances
- D. Is more permeable in neonates than in adults
- ✓ E. Is readily crossed by dopamine

11. In normal cerebrospinal fluid, one is true :

- ✓ A. Chloride concentration is higher than in blood
- B. Glucose concentration is the same as in plasma
- C. PCO_2 is lower than in mixed venous blood
- D. pH is the same as in arterial blood
- E. Bicarbonate concentration is the same as in arterial blood

12. If the body temperature falls during a long operation , all the following are true, EXCEPT:

- A. Oxygen and carbon dioxide are more soluble in blood
- B. Blood viscosity is increased
- C. There is a shift of the oxygen dissociation curve to the left
- D. The effect of non-depolarising drugs is reduced
- E. Acidosis is a common problem

✓ **13. Regarding the passage of ions across a cell membrane, all are true , EXCEPT**

- A. Takes place through temporary open channels
- B. Requires the expenditure of energy
- C. Can occur through ligand-gated channels
- D. Can occur through voltage-gated channels
- ? - E. Involves thyroxine release

14. The synaptic channels on the end-plate of the skeletal muscle are:

- A. Highly selective for Na⁺
- B. Opened when the cell membrane depolarizes
- ✓ C. Activated by acetylcholine
- D. Inhibited by atropine
- E. Responsible for the relative refractory period

✓ **15. Which of the following statements concerning the sympathetic nervous system (SNS) is TRUE?**

- A. The first four to five thoracic spinal segments generate fibers that converge to form three special paired ganglia.
- B. The middle cervical ganglion is also known as the stellate ganglion.
- C. The stellate ganglion provides sympathetic innervations only to the head and neck.
- D. The response of the SNS is very discrete.
- E. One preganglionic fiber influences one postganglionic neuron.

✓ **16. Which of the following statements regarding the parasympathetic nervous system (PNS) is TRUE?**

- A. The sacral fibers originate from the white matter of the second, third, and fourth sacral nerves.
- B. Preganglionic fibers are myelinated fibers analogous to those in the sympathetic and terminate in ganglia next to the spinal cord.
- C. Preganglionic fibers are found in the following cranial nerves: optic, facial, and glossopharyngeal.
- ✓ D. Postganglionic neurons are located in or near the organ to be innervated.
- E. The vagus nerve has the last innervations of all parasympathetic nerves.

17. All the following statements regarding receptors are true EXCEPT:

- A. Acetylcholine is the neurotransmitter at three different classes of receptors.
- B. Cholinergic receptors are located in striated voluntary muscles.
- C. The two subdivisions of cholinergic receptors are muscarinic and nicotinic.
- ✓ D. Muscarinic stimulation causes, bronchodilation, and miosis.
- E. Nicotinic receptors are located in the sympathetic nervous system.

18. Which of the following statements regarding dopamine receptors is TRUE?

- ✓ A. Dopamine -1 receptors are located postsynaptically.
- B. Dopamine -2 receptors are located only presynaptically.
- C. Dopamine receptors have been located in the myocardium and are responsible for increased inotropism.
- D. Dopamine receptors inhibit the release of prolactin in the hypothalamus.
- E. Dopamine -1 receptors are located on vascular smooth muscle of the kidneys and mesentery, and may produce vasoconstriction.

19. The A-beta fiber is:

- A. An efferent to muscle spindles
- ✓ B. A large nerve fiber associated with transmission of deep touch and proprioception
- C. An afferent sensory nerve conducting pain
- D. A preganglionic sympathetic
- E. Not myelinated

20. Preganglionic autonomic nerve fibres are:

- A. Alpha fibers
- B. Beta fibers
- C. Gamma fibers
- ✓ D. B fibers
- E. C fibers

21. All of the following cranial nerves contain parasympathetic efferent fibers EXCEPT:

- A. Oculomotor nerve (III)
- ✓ B. Trigeminal nerve (V)
- C. Facial nerve (VII)
- D. Glossopharyngeal nerve (IX)
- E. Vagus nerve (X)

22. The circulation to the kidneys:

- ✓ A. Is autoregulated over a mean arterial pressure range of 80 to 160 mmHg
- B. Is not regulated by neural factors
- C. Is innervated by sympathetic nerves originating T2-T3
- D. Is not affected by epinephrine
- E. Is constricted by prostaglandin E2

23. The countercurrent mechanism of the kidney involves:

- A. The nephron and the glomerulus
- B. The arteries and veins
- C. A collecting duct and a distal tubule
- ✓ D. The loops of Henle and the vasa recta
- E. The proximal tubule and the distal tubule

24. Metabolic acidosis with a normal anion gap may be caused by:

- ✓ A. Aspirin toxicity
- B. Diabetic ketoacidosis
- C. Chronic diarrhoea
- D. Uremia
- E. Lactic acidosis

25. Reabsorption of filtered water and sodium is enhanced by changes mediated by the hormonal factors, which include all of the following EXCEPT:

- ✓ A. Antidiuretic hormone (ADH)
- ? - B. Atrial natriuretic peptide (ANP)
- C. Aldosterone
- D. Cortisol
- E. Brain natriuretic peptide

26. Chronic gastric secretion losses tend to cause:

- ✓ A. Hypochloremic alkalosis
- B. Hyperchloremic alkalosis
- C. Hypochloremic acidosis
- D. Hyperchloremic acidosis
- E. Alkalosis with anormal chloride value

27. Chronic diarrhea tends to produce:

- A. Hypochloremic acidosis
- B. Hypochloremic alkalosis
- ✓ C. Hyperchloremic acidosis
- D. Hyperhloremic alkalosis
- E. Alkalosis with a normal chloride value

28. What is the typical daily fluid requirement for a 30- kg child?

- A. 300 ml
- B. 3,000 ml
- C. 1,100 ml
- D. 1,400 ml
- ✓ E. 1,700 ml

29. Symptomatic hyperkalemia may be treated with all the following EXCEPT:

- A. Glucose
- B. Sodium bicarbonate
- ✓ C. Spironolactone
- D. Regular insulin
- E. B2 agonists

30. Cardiac output increases with all of the followings, EXCEPT:

- A. An increase in stroke volume.
- B. An increase in dp/dt .
- C. An increase in LVEDV.
- D. An increase in pulmonary venous pressure.
- ✓ E. An increase in aortic pressure.

UK 31. One of the following can be found in normal adult venous blood:

- ✓ A. 3% COHb.
- B. 5% MetHb
- C. 85% OxyHb
- D. 2% free Hb
- E. 2% HbA2

32. All of the following are true in Cardiac ventricular muscle, EXCEPT:

- A. Repolarization time varies with cardiac rate.
- ✓ B. Depolarization is followed by a plateau potential lasting about 200 ms.
- C. Prepotential decay between action potentials is due to declining K^+ efflux.
- D. Cannot be tetanized.
- E. Action potential amplitude is dependent on extracellular Na concentration.

33. Concerning white blood cells, which one is TRUE:

- A. The average half-life in the circulation of neutrophils is 6 hours
- B. Lymphocytes are produced in the liver
- C. Basophils contain heparin and histamine and are phagocytic
- D. Neutrophils attack parasites
- E. T lymphocytes originate in the thyroid.

34. Acute antagonism of beta adrenergic receptors causes one of the following:

- A. Hyperglycemia
- B. Peripheral vasodilatation
- C. Suppression of uterine contractility
- D. Pupillary dilatation
- ✓ E. A reduction in cardiac output

35. All the following are true regarding natriuretic factor EXCEPT:

- ✓ A. It decreases glomerular filtration rate
- B. It is secreted by the cardiac atria
- C. It causes renal artery vasodilatation
- D. Its plasma concentration is directly related to right and left atrial pressure
- E. Hypothermia inhibits its release

36. All of the following are involved in rapid acting mechanism for regulation of blood pressure, EXCEPT:

- ✓ A. Chemoreceptors
- B. Baroreceptors
- C. Renin-Angiotensin system
- D. Atria
- E. CNS ischaemia

UK 37. In a healthy adult human heart, all are true EXCEPT:

- ✓ A. Left ventricular end-systolic volume is approximately 30 ml
- B. First heart sound coincides with the onset of ventricular systole
- C. Stroke volume is approximately 70 ml
- ✓ D. Left ventricular end-diastolic pressure is about 50 mmHg
- E. Second heart sound is caused by closure of the aortic and pulmonary valves

38. An increase in the 2,3-DPG concentration in red blood cells occurs in all of the following , EXCEPT:

- A. Anaemia
- B. Acclimatisation to altitude
- ✓ C. Stored blood
- D. Cyanotic heart disease
- E. This increase will shift the oxyhemoglobin dissociation curve to the right.

UK 39. In normal cardiac cycle , all the following are true , EXCEPT:

- A. Both ventricles contract synchronously.
- B. The right atrium contracts before the left atrium.
- C. The interventricular septum depolarizes from left to right.
- ✓ D. The normal PR interval is 0.22 sec. 0.12-0.20
- E. The refractory period of cardiac muscle is 0.5 sec.

40. Which is false regarding the coagulation of blood?

- A. Initially involves the aggregation of platelets at the point of vessel damage.
- B. Involves of the production of thrombin from factor II
- C. Occurs under either intrinsic or extrinsic cascade.
- D. Is impaired in hemophilia B as a result of factor IX deficiency.
- E. Antithrombin III is potentiated by Heparin. ✓

41. During isovolumetric contraction of the ventricles, one is true:

- A. Aortic blood flow is reversed
- B. Coronary blood flow increases
- C. The pulmonary valve is not yet shut
- ? - D. Aortic pressure is falling
- E. When both ventricles reach the same pressure their respective outflow valves open

42. All the following regarding intra-pleural pressure are true, EXCEPT:

- A. Indirectly can be measured with an esophageal balloon
- B. Is related to diffusion of O₂ into the inter-pleural space?
- C. Becomes increasingly negative with increasing lung volumes during inspiration
- D. It is negative to atmospheric pressure at FRC ?
- E. Is higher in the independent parts of the lung ?

43. Restrictive lung disease is characterized by all of the following, EXCEPT:

- A. A fall in FEV₁
- B. A fall in arterial PO₂
- C. A fall in FEV₁/FVC ratio
- D. PaCO₂ is likely to be unaffected
- E. The work of breathing is increased.

44. Regarding total lung compliance, indicate which one is FALSE?

- ✓ A. Is slightly greater when measured during deflation rather than inflation ?
- B. Is the pressure difference required to achieve a unit of air flow
- C. Is decreased in the presence of interstitial pulmonary fibrosis
- D. Is increased in the presence of emphysema
- E. Will be approximately halved following endobronchial intubation

45. In calculating lung volumes, which one is FALSE?

- A. Anatomical dead space may be estimated using the Bohr equation ✓
- B. V_d/V_t is normally 0.3 at rest ✓
- C. Functional residual capacity cannot be measured directly ✓
- D. Changes in expired nitrogen concentration may be used to determine closing volume ✓
- E. Changes in expired nitrogen concentration may be used to determine residual volume ✓

46. All the following increase pulmonary vascular resistance, EXCEPT:

- A. Maximal inspiration
- B. Anaemia
- C. Maximal expiration
- D. Histamine
- E. Chronic hypoxia

47. The D (A-a) O₂ difference is increased by all of the following, EXCEPT:

- A. Increased left atrial pressure
- B. Decreased plasma oncotic pressure
- C. Abdominal distension
- D. Air trapping
- E. A high inspired oxygen tension

48. Alveolar dead space is increased in all of the following, EXCEPT

- A. Pulmonary embolism
- B. Haemorrhage
- C. Decreased tidal volumes
- D. Changing from the supine to the erect posture?
- E. Intermittent positive-pressure ventilation

49. One of the following causes a decrease in the arterial partial pressure of oxygen: ↓PaO₂

- A. Anaemia
- B. Carbon monoxide
- C. Hyperventilation
- D. A rise in physiological dead-space
- E. Old age

50. Regarding the control of respiration all the following are true EXCEPT:

- A. Control by CO₂ is more through the central rather than the peripheral chemoreceptors
- B. Hypoxia stimulates breathing via the peripheral chemoreceptors
- C. The peripheral chemoreceptors are stimulated by hydrogen ions
- D. The ventilation response to CO₂ is linear over the normal range
- ✓ E. The ventilation response curve to CO₂ is shifted to the left in COPD ()

51. If oxygen is added to inspired air to increase its partial pressure from 150 to 450 mmHg, all of the following will occur, EXCEPT:

- A. Dissolved oxygen will increase approximately three-fold
- B. The oxygen content of the blood will increase approximately three-fold
- C. The PaN₂ will decrease.
- D. The PaO₂ will increase approximately three-fold
- E. Hypercarbia will not be affected.

52. Regarding physiological dead space, all of the following are true, EXCEPT:

- A. Is equal to the sum of the anatomical and the alveolar dead spaces
- ? / B. Is increased with use of PEEP
- C. Increases with increased lung volumes
- D. Can be calculated from PaCO_2 and PaO_2
- E. The ratio of V_d/V_t is approximately 0.3

53. An area in the lung with increased ventilation/perfusion ratio, which statement is true?

- / A. Represents dead space
- B. Represents shunt
- C. Is responsible for a decrease in the PaO_2 with no change in PaCO_2
- D. May be compensated for by an increased FiO_2
- E. May be compensated for by an increased minute Ventilation

54. Which of the following statements is FALSE?

- / A. There are 7 cervical nerves
- B. There are seven cervical vertebrae
- C. T1 projects almost horizontally backwards
- D. T1 is the most readily palpable of the vertebral spines.
- E. The dural sac terminates at the level of the 2nd sacral vertebra

55. The largest cartilage in the larynx is the

- A. Arytenoid cartilage.
- B. Cricoid cartilage.
- C. Corniculate cartilage.
- D. Cuneiform cartilage.
- / E. Thyroid cartilage..

56. About the anatomy of the femoral nerve, which statement is true?

- A. Is formed in the lumbar plexus from L1-L2 roots
- / B. Is lateral to the femoral vein at the inguinal crease VAN
- C. Is separated from the femoral vessels by the fascia lata
- D. lies deep to the fascia iliaca
- E. lies between fascia lata and fascia iliaca

57. The triceps muscle is innervated by which of the following cords of the brachial plexus?

- A. Medial and lateral cords.
- B. Posterior and lateral cords.
- C. Lateral cord only.
- / D. Posterior cord only.
- E. Medial cord only.

58. The musculocutaneous nerve usually emerges from the

- A. Lateral cord
- B. Inferior cord
- C. C5 nerve root
- D. Posterior division
- E. Axillary nerve

UK 59. According to the Severinghaus electrode, one is true:

- A. The electrolyte solution is sodium bicarbonate surrounding a pH-sensitive electrode
- B. Contains carbon dioxide-sensitive gas
- C. Not affected by temperature
- D. Is more accurate for blood than gas sample analysis
- E. Is affected by nitrous oxide

60. The following can be measured with a dry spirometer:

- A. Expiratory reserve volume (ERV)
- B. Functional residual capacity (FRC)
- C. Closing volume
- D. Total lung capacity (TLC)
- E. Dead space volume.

61. Infrared gas analysis can be used to measure all of the following EXCEPT:

- A. Nitrous oxide
- B. Oxygen
- C. Halothane
- D. Carbon dioxide
- E. Trichloroethylene

62. If an electric current is fed through the body, all of the following are true EXCEPT:

- A. Risk of injury is largely dependent upon the current flow
- B. Antistatic shoes provide good protection due to their high resistance
- C. High frequencies are more dangerous than low frequencies .
- D. Ventricular fibrillation occurs at a lower current in patients with dysrhythmias
- E. A tingling sensation is felt at a current strength of 1 mA

63. Most modern vaporizers are classified as all of the following EXCEPT:

- A. Out-of-circuit
- B. Temperature compensated
- C. Flow-over
- ? - D. Pressure compensated
- E. Variable bypass

64. Considering desflurane and the Datex-Ohmeda Tec 6 vaporizer for desflurane, which of the following statements is FALSE;

- A. The vapor pressure of desflurane is six to seven times that of contemporary inhaled anesthetics. 3-4
- B. Desflurane has a low blood gas coefficient, making recovery from anesthesia more rapid.
- C. Desflurane can boil at room temperature.
- D. The Tec 6 is electrically heated and pressurized.
- E. The Tec 6 output is affected by carrier gas composition.

65. Factors influencing rebreathing include all of the following EXCEPT;

- A. Back flow
- B. Fresh gas flow
- C. Mechanical dead space
- D. Design of breathing system.
- E. Type of endotracheal tube.

66. Humidification and heating of inspired gases are best achieved by using:

- A. Mapleson breathing system
- B. Lack breathing system
- C. Bain breathing system -
- D. Circle system -
- E. Jackson-Rees breathing system

UK 67. Pressure gauges:

- A. Work on the Bourdon principle
- B. Can be used to regulate gas flow
- C. Can convert gas at a high pressure into gas at a low pressure
- D. Form part of a flow meter
- E. Has no inertia

68.. Halothane concentrations can be measured using the following methods EXCEPT:

- A. Absorption to silicon rubber
- B. Ultraviolet light absorption
- C. Infrared light absorption
- D. Refractrometry
- E. Paramagnetism

69. Regarding flow of gases:

- A. It is proportional to fourth power of the radius in turbulent flow
- ✓ B. Resistance is directly proportional to length of a tube
- C. Low density gas is likely to develop turbulent flow
- D. Flow is not dependent on viscosity in laminar flow
- E. Flow is inversely proportional to the square root of pressure in turbulent flow

70. At high altitude (6000 m), all are true EXCEPT:

- ✓ A. The barometric pressure is the same as sea level
- B. FiO_2 is 0.21
- C. The saturated vapour pressure of water is 6.3 kPa at 37 degrees Celcius
- D. The boiling point of water would be low
- E. Hypoxia predominates the ventilator drive

71. One of the following statements concerning the fail-safe system of the anesthesia machine is correct:

- A. Is a link between the flowmeters in modern machines to prevent a hypoxic mixture.
- B. Opens the O_2 tank supply to the anesthesia machine if the wall supply fails.
- ✓ C. Senses a drop in main O_2 pressure and proportionately decreases N_2O supply to prevent a hypoxic mixture.
- D. Prevents a hypoxic mixture if there is a leak in the system upstream from the vaporizers.
- E. Is placed between the flowmeters and the patients as an O_2 sensor to prevent a hypoxic mixture.

72. The statement that equal volumes of gases at the same temperature and pressure contain equal numbers of molecules is:

- A. Charles' law
- B. Boyle's law
- C. Lavoisier's law
- ✓ D. Avogadro's hypothesis
- E. Archimedes' hypothesis

73. The vapor pressure of a liquid is most dependent on the:

- A. Atmospheric pressure
- B. Specific heat of the liquid
- ✓ C. Temperature.
- D. Thermal conductivity of the container
- E. Molecular weight of the liquid

74. The number of calories required to raise the temperature of 1 gram of a substance by 1°C is:

- A. The heat of vaporization
- B. The specific heat
- C. The critical temperature
- D. Thermal conductivity
- E. Equal for all substances

75. The latent heat of vaporization:

- A. Is equal for all liquids
- B. Is independent of the ambient temperature
- C. Varies with the temperature of the liquid
- D. Is very low for solids
- E. For water is 1 cal/mL

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